ACT HEALTH PROTECTION SERVICE

MICROBIOLOGICAL QUALITY OF SOFT CHEESES

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BACKGROUND/OBJECTIVE

Soft, semi-soft cheese and all raw milk cheeses are a high risk food which has received media attention in recent years because of recalls associated with microbiological contamination. Soft cheeses are high risk food for pregnant women and vulnerable people due to *Listeria monocytogenes. Listeria monocytogenes* has the potential to cause spontaneous abortion and stillbirth in pregnant women and meningitis and/or septicaemia in vulnerable people. Previous surveys in the ACT have identified an issue with handling of cheese products, namely ricotta cheese.

The survey of soft cheese products was undertaken for the following reasons:

- determine the current microbiological status of soft cheese in the ACT market as well as handling practices in delicatessens across the ACT;
- determine the compliance of these products to Food Standards Australia New Zealand (FSANZ) Food Standards Code; and
- complement and focus inspections of high-risk food producing establishments.

STANDARDS

The FSANZ Food Standards 1.6.1 Microbiology limits for foods identifies three microorganisms used to determine microbiological quality of soft cheeses. Table 1 below is excerpt from the above mentioned food standard. Table1 indicates the level of contamination that is considered to be unsatisfactory.

Table 1

Food	***Microorganism***	**Microbiological Quality (colony forming units per gram (cfu/g))**		
		Satisfactory	**Marginal**	**Unsatifactory**
All cheese	*Escherichia coli (E. coli)*	<10	<100	≥100
Soft and semi-soft cheese (moisture content > 39%) with pH >5.0	*Listeria monocytogenes*	Not detected in 25g		detected
	Salmonella	Not detected in 25g		detected
All raw milk cheese (cheese made from milk not pasteurised or thermised)	*Listeria monocytogenes*	Not detected in 25g		detected
	Salmonella	Not detected in 25g		detected

SURVEY

This survey was conducted between 1 February 2011 and 30 April 2011. During this period forty nine samples were collected from fifteen ACT retail outlets by Health Protection Service (HPS) Environmental Health Officers (EHO) and processed by the HPS Laboratory. The samples were collected in such a manner as to cover a wide range of the available soft, semi soft and raw milk cheeses. All of the samples were tested for the hygiene indicator *E.coli*, and the food pathogens *Salmonella* and *Listeria monocytogenes.* The survey collected multiple samples from single outlets and in general outlets were only tested once.

Marginal results may be re-sampled; this is dependent on resources as these foods are still considered compliant. Where the HPS identifies non compliance issues in food businesses, corrective actions are addressed through a graduated and proportionate response. Unsatisfactory results are re-sampled; if the food item is not available other food items may tested.

MICROBIOLOGICAL METHOD OF ANALYSIS

Samples were tested for the presence of:

- *Salmonella* species using AS: 5013.10–2004 (modified)
- *Escherichia coli* using ISO16649-2
- *Listeria monocytogenes* using AS 1766.2.16.1 (modified).

The sample preparation consisted of:

- ***Escherichia coli* enumeration:** 25g of sample was weighed out aseptically and homogenised with 225mL of 0.1% peptone diluent. TBX agar pour plates of 1ml of 10^{-1} dilution were prepared in triplicate and incubated at 37ºC/4 h followed by 44ºC/20hrs *E. coli* colonies appear blue/green after incubation.

- ***Salmonella* detection:** 25g of sample was weighed out aseptically and homogenised with 225mL buffered peptone water (non-selective enrichment) and incubated at 37°C/16-20 h. Aliquots were then transferred into Brain Heart Infusion broth (BHI) and incubated for 4h. DNA was extracted from 200uL of enriched BHI. This was screened for the presence of salmonella using a BAX cyber green Polymerase Chain Reaction (PCR) and a BIO-RAD I cycler. No confirmation testing was performed as there were no samples that screened positive.

- ***Listeria monocytogenes* detection:** 25g of sample was weighed out aseptically and homogenised with 225mL half Fraser broth (selective enrichment) and incubated at 30°C/24h. Aliquots were then transferred into a single tube of Fraser broth incubated for 37°C/48h and MOPS BLEB broth incubated for 37°C/24h. DNA was extracted from 200uL of enriched MOPS BLEB broth. This was screened for the presence of *Listeria monocytogenes* using a BAX cyber green PCR and a BAX Q7 System. Confirmation testing was performed using the incubated Fraser broth tubes. A loopful of each positive sample was streaked out onto Oxford and Palcam agar and incubated for 37°C/48h. Up to ten typical colonies on (appear in the form of green colonies about 1.5 to 2.0 mm in diameter, with a central depression and surrounded by a black halo) Oxford agar and Palcam agar were streaked each onto a CAMP plate (Sheep blood agar) and incubated for 37°C/24h. Positive CAMP isolates are then inoculated in a Rhamnose and Xylose broths and incubated at 37°C for up to five days. A positive reaction usually occurs within 24h to 48h. *Listeria monocytogenes* is positive for Rhamnose (Yellow) and negative (Blue-green) for Xylose.

RESULTS / DISCUSSION

Escherichia coli

All samples (49) were tested for *E. coli*. The presence of *E. coli* in soft cheese is undesirable because it indicates that the food has possibly been prepared under poor hygienic conditions. Ideally *E. coli* should not be detected and as such a level of <3 cfu/g (the limit of the test) has been set for satisfactory samples. *E. coli* was not detected in any of the forty nine samples.

***Salmonella* spp.**
Salmonella spp. was not detected in any of the forty nine samples tested. Soft cheeses should be free of *Salmonella* spp. as consumption of food containing this pathogen may result in food-borne illness.

Listeria monocytogenes
Forty nine samples were analysed for *Listeria monocytogenes*. Forty eight (98.0%) of the samples were satisfactory i.e. *Listeria monocytogenes* was not detected, whereas one (2.0%) sample was positive for *Listeria monocytogenes*. The positive sample originated from a sample of baby bocconcini. EHO inspected the premises selling the foods. Two samples of the same food item was collected and tested. The repeat samples tested negative for *Listeria monocytogenes*.

CONCLUSION

The microbiological quality of soft cheeses surveyed in the ACT is good. Raw results of the analysis are attached at Appendix A. *E.coli* or *Salmonella* were not detected in the samples. Only one sample tested positive for *Listeria monocytogenes* and on inspection and resampling the food item tested negative. The results were an improvement on the previous surveys (see Appendix1); it appears that food handling practices and the quality of cheeses surveyed has improved.

Listeria monocytogenes is widely found in the environment so most raw foods are likely to be contaminated. *Listeria monocytogenes* is easily killed by heat, although cooked foods can easily become re-contaminated through poor food handling after cooking. *Listeria monocytogenes* is one of the few pathogens that can grow slowly in the refrigerator on foods that can support growth like soft cheeses.

Listeria monocytogenes can cause listeriosis which is a rare form of foodborne illness and can be a very serious disease in pregnant women, people with poor immune systems and the elderly. It has also caused occasional outbreaks of mild gastroenteritis in healthy people. Infections in pregnant women may result in miscarriage, even if they don't present any symptoms.

In conclusion, the results of this survey show a very high level of compliance with the Food Standards Australia New Zealand Guidelines for the Microbiological limits for foods Standard 1.6.1.

BIBLIOGRAPHY

1. Food Standards Code Standard 1.6.1 Microbiology limits for foods, FSANZ.
2. Microbiological Quality of Cheese April – June 2002, ACT Health Protection Service.
3. Report on Cheese Products Survey July 1995 – June 1996, ACT Health Protection Service.
4. Microbiological and Chemical Quality of Cheese and Cheese Products April – June 1998, ACT Health Protection Service.
5. Foodborne Microorganisms of Public Health Significance, AIFST Inc. Food Microbiology Group.
6. Food Safety Information Council FAQs.

Appendix 1

Comparison to previous surveys: 1995 – 1996, 1998, 2002 and 2011.

Tables 1 clearly indicate that the quality of cheeses has slowly improved over the years.

Table 1

Comparison between the Microbiological limits from FSANZ Food Standards 1.6.1

%	1995-1996		1998		2002		2011	
	Acceptable	**Not Acceptable**	**Acceptable**	**Not Acceptable**	**Acceptable**	**Not Acceptable**	**Acceptable**	**Not Acceptable**
E. coli	N/A	N/A	94.5	5.5	93.2	6.8	100	0
Salmonella spp.	N/A	N/A	100	0	100	0	100	0
Listeria monocytogenes	95.0	5.0	90.3	9.7	97.9	2.1	98	2

Appendix 2

Sample Description	*L. monocytogenes* in food P/A in 25g	*Salmonella* in food P/A in 25g	*E. coli* count in food cfu per gram	Assesment
Ricotta Cheese	Absent	Absent	<3	S
Ricotta Cheese Low Fat	Absent	Absent	<3	S
Danish Feta Cheese	Absent	Absent	<3	S
Ricotta Cheese	Absent	Absent	<3	S
Ricotta Cheese Low Fat	Absent	Absent	<3	S
Ricotta	Absent	Absent	<3	S
Tasmanian Brie	Absent	Absent	<3	S
Triple Cream Brie	Absent	Absent	<3	S
Blue Cheese	Absent	Absent	<3	S
Bocconcini	Absent	Absent	<3	S
Farm Cheese	Absent	Absent	<3	S
Ricotta Fresh	Absent	Absent	<3	S
Brie Double	Absent	Absent	<3	S
Camembert	Absent	Absent	<3	S
Brie De Nangis	Absent	Absent	<3	S
Touree De Laubier	Absent	Absent	<3	S
Stilton	Absent	Absent	<3	S
Fromager D Affinios Fromagede brebis	Absent	Absent	<3	S
Ricotta	Absent	Absent	<3	S
Gorgonzola	Absent	Absent	<3	S
Brie Cheese	Absent	Absent	<3	S
Camembert Cheese	Absent	Absent	<3	S
Ricotta reduced fat	Absent	Absent	<3	S
Ricotta	Absent	Absent	<3	S
Blue Cheese	Absent	Absent	<3	S
Triple Cream	Absent	Absent	<3	S
Brie	Absent	Absent	<3	S
Lactose Red Square	Absent	Absent	<3	S
Appenzeler (Black Label)	Absent	Absent	<3	S
Australian Full Cream Fetta	Absent	Absent	<3	S
Ricotta Low Fat	Absent	Absent	<3	S
Ricotta Fresh	Absent	Absent	<3	S
Farm Cheese	Absent	Absent	<3	S
Gorgonzola Cheese	Absent	Absent	<3	S
Triple Cream Blue	Absent	Absent	<3	S
Red Cheese	Absent	Absent	<3	S
Gorgonzola cheese	Absent	Absent	<3	S
Blue Cheese	Absent	Absent	<3	S
Heritage Red Square	Absent	Absent	<3	S
Bocconcini	Absent	Absent	<3	S
Full Cream Ricotta	Absent	Absent	<3	S
Danish Blue Cheese	Absent	Absent	<3	S

Sample Description	*L. monocytogenes* in food P/A in 25g	*Salmonella* in food P/A in 25g	*E. coli* count in food cfu per gram	Assesment
Bulgarian Sheep's Fetta	Absent	Absent	<3	S
Walnut Cheese	Absent	Absent	<3	S
Mature Cheddar	Absent	Absent	<3	S
Fresh Ricotta	Absent	Absent	<3	S
Feta Dodoni	Absent	Absent	<3	S
Danish Feta	Absent	Absent	<3	S
Full Cream Ricotta	Absent	Absent	<3	S
Danish Feta	Absent	Absent	<3	S
Full Cream Ricotta	Absent	Absent	<3	S
Fior di latte	Absent	Absent	<3	S
Danish Blue Cheese	Absent	Absent	<3	S
Baby Bocconcini	Present	Absent	<3	U
Fior di Capra (goats cheese)	Absent	Absent	<3	S
Double Brie	Absent	Absent	<3	S
Blue Stilton	Absent	Absent	<3	S
Deluxe Blue	Absent	Absent	<3	S
Brie	Absent	Absent	<3	S
Baby Bocconcini	*Absent*	*N/A*	*N/A*	*S*
Bocconcini pearl	*Absent*	*N/A*	*N/A*	*S*

Note: Italicised samples are re-sampled products.
Assessment: S = satisfactory and U = unsatisfactory.